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A CLINICO-PATHOLOGICAL AND IMMUNOPARASITOLOGICAL STUDY ON TOXOC--ETC(U)
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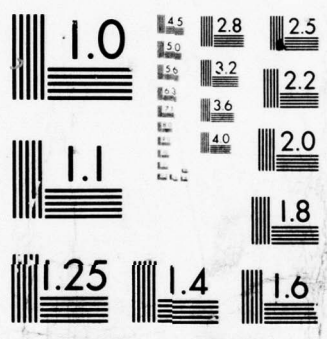
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A CLINICO-PATHOLOGICAL AND IMMUNOPARASITOLOGICAL STUDY
ON TOXOCARIASIS IN EGYPT.

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BY

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OFFICE OF NAVAL RESEARCH
A CLINICO-PATHOLOGICAL AND IMMUNOPARASITOLOGICAL
STUDY OF TOXOCARIASIS IN EGYPT.

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Background:

Toxocariasis canis worms being widely distributed and recognised harmful to man and constituting a public health problem (Woodruff, 1973). Man may act as an accidental host is infected by ingestion of the infective eggs with resulting migration of Toxocara larvae through the tissues with encystment in the various organs (Bisseru, 1967). Infection of the human beings gives rise to eosinophilia, hepatomegaly, recurrent fever dyspnoea or bronchospasm (Beaver et al., 1952, Synder, 1961, Woodruff et al. 1964, Huntley et al. 1963). Also, infection can give rise to retinal granulomata or chronic endophthalmitis (Wilder, 1950, Duguid 1961, Perkins, 1966) or

encephalitis with convulsions (Brain and Allan, 1964, Schoenfeld et al. ,1964). It may possibly act in some cases as a vehicle for microbial or viral infections(Woodruff, 1968, Khalil et al. 1971).

However, the infection is obscure and only a small number of cases have been recorded (Ashton, 1960, Woodruff et al.1966, Beaver, 1962). Ashton (1960), was the first to recognise ocular involvement by Toxocara in England and reported 4 cases of granulomatous lesions of the retina due to this Ascarid nematode common in dogs and cats.

Considerable interest about importance of nematode endophthalmitis has been aroused since Wilder's (1950) important observations i.e. the finding in a histological study of pseudogliomata nematode larvae or their hyaline capsules in about half of the cases, and in the remainder tissue reactions characteristic of nematode endophthalmitis. Nichols (1956) successfully demonstrated T.Canis larvae as a cause of granulomatous reaction in the retina of the eye.

Infection with toxocariasis often occurs as a result of close contact with infected pets. However, some of the reported cases have no pets in their house held and their contact with pets has been casual, Woodruff (1970). This situation raises the

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question of soil contamination with *Toxocara* ova and its role in transmitting the infection to man.

The diagnosis of toxocariasis is usually not easy to establish due to lack of maturation of the *Toxocara* larvae in human tissues, no ova is expected to pass through the stools of man. Serological or immunological tests appear to offer the best opportunity for determining the prevalence of toxocaral infection among apparently healthy persons and among those in whom the infection is suspected, Khalil (1964), Borg (1973). *Toxocara* intradermal test and the precipitin absorption test are used for diagnosis. Little information is known concerning the incidence of Toxocariasis in Egypt. Bearing in mind the close contact between dogs and man it is clear that the possibility of human infection is considerable. Khalil (1964), found that the incidence of toxocariasis in Siwa Oasis as shown by I.D.T. is very high 50%, while the incidence of Ascariasis by stool analysis was 42% though there is cross reaction between it and ascariasis. Khalil (1962) discovered *T. canis* eggs in stools of Siwa inhabitants, most probably due to contamination from contact with infected dogs. Beaver et al. (1952-1953) were the first to recognise larvae of *T. canis* in the liver of a child who was

suffering from pyoderma, hepatomegaly and eosinophilia.

MATERIAL AND METHODS

In the present study, appreciating the importance of Toxocariasis in man and among stray dogs and cats as a very important source of infection; different surveys have been performed among these animals in different governorates of Egypt and in man. Also, a study of the T. canis infection of the human beings for the larval stages as a possible cause of blindness had been performed.

I- Study of animals:

170 stray dogs and 218 stray cats were captured alive from two ecologically different areas, one rural in Giza Governorate and the other urban in Cairo Governorate. Dogs and cats were caged individually. Their stools were collected in clean petri-dishes, homogenized in ten times their volume of tap water and then strained to get rid of large particles. Thereafter direct smears were done and microscopically screened for Toxocara ova. Another examination was done using Brine flotation technique. Toxocara ova were identified after Lapage (1962).

II- Study in man:

a) The prevalence of toxocariasis among stool children in Mansoura City: 400 apparently primary school children aged 6-12 years were tested with the Toxocara intradermal test and the precipitin absorption test. The toxocara antigen has been prepared from adult Toxocara canis worms and larvae according to the methods described by Duguid (1961). 0.1 ml. of 1/1000 dilution of the antigen was injected intradermal in one forearm and the control in the other, the results were read 36-hours later. A wheal and induration with an area more than 12mm. in diameter was taken as a positive reaction. Serum of positive reactors were tested using the precipitin absorption test in order to avoid cross reaction between Ascaris and Toxocara antigens. Absorption with Ascaris antigen 1:50 was carried out to all sera of positive reactors. These were left over night in the incubation at 37°C. Sera that showed precipitation were tested with the Toxocara antigens at different dilutions.

b) Specimens of soil were collected from public gardens and children play grounds in Mansoura City. Samples of about 250g. were collected from places not less than 150 meters apart. The samples were examined parasitologically using the modified ~~mm~~

cort technique described by Spindler (1929).

c) The frequency of infection with *T.canis* was determined among dogs in Mansoura: 200 faecal specimens of stray dogs were examined by the brine floatation method.

d) The incidence of Toxocara infection among the population and stray dogs of Siwa Oasis, Qena and Aswan Governorates was studied (Khalil 1976 a).

e) In man: 446 cases were examined at Siwa Oasis among those attending the outpatient clinic of the hospital as well as those of the primary and preparatory school, children who formed the main bulk of the cases examined in Siwa.

Also, 135 cases were examined at Luxor City among those attending. Similarly 300 individuals were examined at Aswan among those presented to the outpatient clinic of Aswan General Hospital. Cases examined in the three localities have an age group between 15-25 years and of both sexes. Blood samples were collected from the individuals, sera were separated and the precipitin absorption test (P.A.T.) was performed on the above same lines. Also, the intradermal test (I.D.T.) was done for all

cases by the same antigens.

2- Stray dogs: 100 dogs were captured alive from Siwa Oasis, 100 from Luxor and 100 from Aswan. Dogs were caged individually. Their stools were collected, treated and examined according to the ~~above~~ mentioned lines for Toxocara ova.

e) The relation between Toxocaral infection and some clinical syndromes which might be co-existing with it was studied among Egyptians at Mansoura: 100 cases of hepatomegaly with eosinophilia, 40 cases of asthma and 20 cases of eosinophilia (i.e. more than 500 cells/cml.). All were children below 10 years age. They were tested by the Toxocara I.D.T. and the P.A.T. Serum of all patients were tested by P.A.T. in order to avoid cross reaction between Ascaris and Toxocara antigen.

Absorption with Ascaris antigen 1:50 was carried out to all sera. These were left over night in the incubator at 37°C. Sera that showed precipitin were tested with Toxocara antigen at different dilutions (Khalil, 1976 a, 1976b).

f) Toxocara canis infection as a possible cause of blindness

in the humans: 54 blind cases were chosen randomly from one of the big institutes at Cairo for the Welfare of the blind boys and were examined. All were boys and their ages ranged 8-15 years. A detailed history was obtained from every case and a complete medical examination was done regards the abdomen, chest and mentality. A complete ophthalmological examination was also done, including complete urine and stool examination, blood picture (specially eosinophilic count), as well as Toxocara skin test. Also P.A.T. was done on sera of positive skin test reactors (Khalil, 1976 e).

RESULTS AND DISCUSSION

1) Stray dogs and cats from Cairo and Giza: 137 dogs out of 170 ones investigated from both Cairo and Giza Governorates were positive for Toxocara infection (80.6%).

49 cats out of 218 ones investigated from both localities were positive for Toxocara infection (22.5%).

The above results are more or less comparable with the

results obtained by Rifaat et al. 1969 for stray dogs in Cairo (82.5%) and also similar to the results of Woodruff et al. 1964 for *Toxocara* infection of cats in England(22.7%) using the same technique similar result for infection in dogs were obtained by (Maplestone and Bhaduri, 1940) in Calcutta and by Nuttal and Strickland, 1908 in Cambridge 82.8% and 70.8% respectively.

2) *Toxocariasis* at Mansoura, Dakahlia Governorate:

Among 400 children tested with the *Toxocaral* intradermal test, 100 showed positive reaction (25%). They were suspected to have *Toxocaral* infection. Serum of positive reactors were tested by P.A.T., 2% of the examined serum showed precipitin with *Toxocara* antigen at a titre of 1/160.

SOIL SAMPLES OF MANSOURA CITY:

Of the 100 soil samples collected and examined parasitologically 10% were shown to contain ova of the *Toxocara* species. Positive results were obtained from all the regions investigated.

Toxocara canis among dogs in Mansoura: Examination of 200

faecal specimens showed an average rate of infection of 50.2%. 100 of these specimens showed T.canis ova (Khalil et al. 1976a and 1976b).

The incidence of toxocariasis in 2% of the apparently healthy individuals at Mansoura City together with the presence of pollution of the soil with Toxocara ova and regarding the considerable reservoir of infection among dogs indicate that toxocariasis although not causing a serious illness but is an important cause of morbidity.

Toxocariasis in man and dogs at Siwa Oasis, Qena and Aswan Governorates: Results obtained are shown in the following table (Khalil et al. 1976d).

From the above results it is shown that the incidence of Toxocara infection judged by the skin test is highest at Aswan (70.1%), followed by Luxor (65.1%) and is lowest at Siwa Oasis (32.6%).

However, by doing the precipitin absorption test using Toxocara antigen lower figures of positive reactions were

obtained on sera of cases from the three localities i.e. 2.9% at Aswan, 3.7% at Luxor and 2.2% at Siwa Oasis. The difference is significant due to cross reaction between Ascaris and Toxocara antigens.

A high percentage of toxocariasis in man in Siwa Oasis as shown by I.D.T. was reported by Khalil (1964), 50%. A comparable result was obtained in man in the present study at Siwa Oasis i.e. 32.6% positive reactors to the Toxocara skin test antigen together with 68% infection in stray dogs.

Concerning toxocariasis in dogs similar previous results (82.5%) were obtained by our previous report (1969). This coincides with the present findings on toxocariasis in dogs i.e. 83% at Luxor, 79% at Aswan and 68% at Siwa Oasis.

Toxocariasis in man at Mansoura associated with some clinical syndromes (Khalil et al. 1976).

1- Out of 100 cases with hepatomegaly, 25 were positive by skin test and 36 by absorption of their serum with Ascaris antigens, but only 5 positive by precipitation with Toxocara antigen i.e. 5%.

2- Out of 40 asthmatic cases 3 were proved positive for *Toxocara* i.e. 7.5%.

3- Out of 20 eosinophilic cases 4 were proved positive for *Toxocara* i.e. 20%.

The development of eosinophilia and also of hepatomegaly in children infected with *Toxocara canis* was observed. That was confirmed experimentally by Smith and Beaver (1953). As the *T. canis* larvae enter the lungs of experimental animals the toxocaral skin test and P.A.T. have been performed in patients with asthma.

Results of 5% positive among hepatomegaly cases, 7.5% positive in asthmatics and 2% positive in cases with eosinophilia if compared with 2% of positive reactors among healthy controls give a difference which is significant, indicating that Toxocaral infection is wide-spread at Mansoura, often silent but not uncommonly serious.

Toxocariasis and human blindness (Khalil et al. 1966a):—

The cases of blindness examined at the institute as revealed by taking history from patients and their relatives were as follows: 1- Congenital (10 cases). 2 - Traumatic (8 cases).

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- 13 -

3- Inflammatory (15 cases. 4- Tumours (2 cases). 5- After fevers as encephalitis, measles (7 cases). 6- Unknown causes (12 cases).

The toxocara skin test was positive in 20 cases (37%), 2 of these cases were positive for Ascaris, 4 cases for H.nana, 2 cases for E.histolytica and 12 cases were negative as revealed by stool examination.

The precipitin absorption test was positive in only one case. This case was a blind male aged 15 years and gave history of surgical enucleation of both eyes 10 years before the time of the present examination for presumable diagnosis of a malignant tumour of one eye. He had an eosinophelic count 350/cmm and the urine and stool examination were free.

Considering that many children encounter these common pets, a history of contact may be inquired about in suspected cases? Wilder (1950), directed attention to the possibility that toxocariasis probably play an important part in causing blindness in American children and this possibility had been overlooked.

Most of the previously reported cases of ocular toxocariasis were enucleated for malignant tumours and the correct diagnosis was only established after meticulous pathological examination (Wilder, 1950; Ashton, 1960 and Duguid, 1961).

The fact that this patient has had his eyes removed 10 years ago and is still enjoying good general health with no evidence of metastasis, could be taken as an evidence against the diagnosis of malignant tumour.

The positive skin test, the positive P.A.T. and the relatively high eosinophilia (350/cmm) favours the diagnosis of toxocariasis in this case.

Care must be taken to diagnose cases of toxocaral endophthalmitis and to avoid them being overlooked by the ophthalmologists and co-operation is needed in the sero-diagnosis by the various tests to screen out the hidden cases.

Area	No. examin.	No. +ve IDT	% +ve IDT.	% + ve P.A.T. (with Txc.Ag.after abs. with Asc.Ag.)	% Txc infect. in dogs
Siwa	446	145	(32.6%)	122%	68%
Qena (Luxor)	135	88	(65.1%)	(3.7%)	83%
Aswan	300	210	(70.1%)	(2.9%)	79%

CONCLUSION AND SUMMARY

↘ A survey for the detection of the incidence of T.canis and T.cati infection among stray dogs and cats has been performed in Cairo and Giza Governorates. Similarly Toxocariasis in man at Dakahleya Governorates, Siwa Oasis, Qena and Asswan Governorates were done together with the determination of the incidence of Toxocara infection in dogs in these areas. Moreover, Toxocara infection was studied in cases associated with clinical syndromes and also as being a cause of blindness in Egyptian children results interpreted on this light of the prevalence of infection in stray dogs and cats, the high chances of close contact with infected dogs and the heavy soiling by the ova present in the faeces from a dog with Toxocara, contamination of food of man and ingestion of embryonated ova liberating larvae which according to Sprent (1954) are liable to migrate any where in the body but specially to the lungs, liver, brain and by chance to the eyes and naturally evoking antibodies which can be detected by different serological tests.

It can be concluded that the dog is a very important source for Toxocara infection of the human beings by the larval stages, next to follow the contamination soil with T.canis ova. ↙

(P.T.O.)

RECOMMENDATIONS FOR FURTHER WORK, CONTINUATION OF THE
SURVEY IN OTHER PARTS OF EGYPT ON THE SAME LINES IS
RECOMMENDED FOR 2 TWO YEARS USING MORE SENSITIVE
SEROLOGICAL TECHNIQUES.

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